



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/003,114	12/06/2001	Masaki Yamada	216932US2	5215
22850	7590	02/16/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.			MANDALA, VICTOR A	
1940 DUKE STREET			ART UNIT	
ALEXANDRIA, VA 22314			PAPER NUMBER	
			2826	

DATE MAILED: 02/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/003,114

Applicant(s)

YAMADA ET AL.

Examiner

Victor A. Mandala Jr.

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-31 is/are pending in the application.
- 4a) Of the above claim(s) 11-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-10, & 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The Applicant argues that the prior art rejection 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2003/0205815 Chung. does not teach the insulating film configured to prevent diffusion of a conductor material in the conductive layer. The examiner has considered the Applicant's arguments, but finds them to be non-persuasive because the insulating film is materially the same as the claimed insulator, (see claim 10 and Chung Paragraph 0092 Line 17), hence having the same material properties. Since the insulating film is made out of any one of polyarylene and berlzo cyclo-butene, the film will prevent the diffusion of a conductor material in the conductive layer. The previous rejection stands as is and is made final.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 5-8 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S.

Patent Application Publication No. 2003/0205815 Chung.

2. Referring to claim 1, a semiconductor device comprising: a first interlayer insulating layer, (Figure 4H organic low-k dielectric lower layer); a trench, (Figure 4H the are where it is labeled metal), formed in the first interlayer insulating layer, (Figure 4H organic low-k dielectric

Art Unit: 2826

lower layer); a conductive layer buried in the trench, (Figure 4H the are where it is labeled metal), the conductive layer, (Figure 4H the are where it is labeled metal), having a surface thereof higher than a highest surface of the first interlayer insulating layer, (Figure 4H organic low-k dielectric lower layer), surrounding and adjoining the trench, (Figure 4H the are where it is labeled metal); an insulating film, (Figure 4H inorganic low-k dielectric middle layer), having a flat surface and covering the first interlayer insulating layer, (Figure 4H organic low-k dielectric lower layer), and the conductive layer, (Figure 4H the are where it is labeled metal), the insulating film, (Figure 4H inorganic low-k dielectric middle layer), configured to prevent diffusion of a conductor material, (claim 10 and Paragraph 0092 Line 17), in the conductive layer, (Figure 4H the are where it is labeled metal); and a second interlayer insulating layer, (Figure 4H inorganic low-k dielectric upper layer), formed on the insulating film, (Figure 4H organic low-k dielectric middle layer), the second interlayer insulating layer, (Figure 4H inorganic low-k dielectric upper layer), having a high etching selective ratio, (Paragraph 0090 Lines 28-30 & 34-35 and Paragraph 0106 Lines 16-20), to the insulating film, (Figure 4H organic low-k dielectric middle layer).

3. Referring to claim 2, a semiconductor device, wherein a film thickness of the insulating film, (Figure 4H organic low-k dielectric middle layer), on the first interlayer insulating layer, (Figure 4H inorganic low-k dielectric lower layer), is greater than that on the conductive layer, (Figure 4H the are where it is labeled metal).

4. Referring to claim 3, a semiconductor device, wherein the insulating film is made of a coating type material, (Paragraph 0100).

Art Unit: 2826

5. Referring to claim 5, a semiconductor device, wherein at least any one of the first interlayer insulating layer, (Figure 4H organic low-k dielectric lower layer), and the second interlayer insulating layer, (Figure 4H organic low-k dielectric upper layer), is made of an insulating material having a relative dielectric constant lower than that of an SiO₂ film, (Paragraphs 0093-0094).
6. Referring to claim 6, a semiconductor device, wherein the insulating film, (Figure 4H inorganic low-k dielectric middle layer), is made of an insulating material having a relative dielectric constant lower than that of an SiO₂ film, (Paragraph 0092).
7. Referring to claim 7, a semiconductor device, wherein the conductive layer includes a barrier metal layer, (Paragraph 0104 Lines 52-59).
8. Referring to claim 8, a semiconductor device, wherein the conductive layer includes a Cu wiring layer, (Paragraph 0104 Lines 61-63).
9. Referring to claim 10, a semiconductor device, wherein the insulating layer: film is made of any one of polyarylene and benzocyclobutene, (Paragraph 0092 Line 17).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent

Application Publication No. 2003/0205815 Chung. In view of U.S. Patent No. 6,333,232

Kunikiyo

Art Unit: 2826

10. Referring to claim 9, a semiconductor device, wherein at least any one of the first interlayer insulating layer, (Figure 4H organic low-k dielectric lower layer), and the second interlayer insulating layer, (Figure 4H organic low-k dielectric upper layer), is made of methylpolysiloxane, (Chung Paragraph 0094 where it is taught a similar dielectric is used such as hydrogenmethysiloxane).

Chung discloses the claimed invention except for the organic dielectric material being made out of methylpolysiloxane, but Kuniyoshi does in Col. 26 Lines 6-13. It would have been obvious to one having ordinary skill in the art at the time the invention was made to the low dielectric organic layer out of methylpolysiloxane, which also holds the properties of being a low k dielectric, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2003/0205815 Chung.

11. Referring to claim 31, a semiconductor device, wherein the insulating film, (Figure 4H inorganic low-k dielectric middle layer & claim 10 and Paragraph 0092 Line 17 where the film is the same material resulting in the same material properties), suppresses a progress of etching of a contact hole formed in the second interlayer insulating layer, (Figure 4H inorganic low-k dielectric upper layer), so as not to reach the first insulating layer, (Figure 4H organic low-k dielectric lower layer). AND See ** on the next page

Art Unit: 2826

****** Initially, and with respect to claim 31, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hira, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 USPQ 289 (CAFC); and most recently, In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear.

As to the grounds of rejection under section 103, see MPEP § 2113

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor A Mandala Jr. whose telephone number is (571) 272-1918. The examiner can normally be reached on Monday through Thursday from 8am till 6pm..

Art Unit: 2826

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VAMJ
8/20/04


NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800